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From a man of Dr. Leidy's industry we may expect to hear of many plans entertained but subsequently abandoned, of many discoveries actually his own with which his name is not associated. At one time he contemplated writing a work on comparative anatomy, but was deterred from so doing when, upon inquiry of the publishers, he learned how small was the demand for writings of this kind. We cannot but regret that he did not entertain the subscription plan for reimbursement. For no one can doubt the fact that his admirers would have eagerly provided the means for publication had his wishes been more generally known. Respecting his unrecorded discoveries no one can speak with authority. On one subject he has himself spoken, namely, that the discovery of the tactile corpuscle on the nerves of the finger is his own. He occasionally referred to this as an instance of the dangers of procrastination in not placing upon record original observations the moment the facts became clearly defined in the mind of the investigator. He also frequently alluded to his having observed the amœboid movement in the white corpuscles. But he interpreted them to be pathological and hesitated in recording his discovery. This he used to say was one of the greatest mistakes of his life. But no discoveries of this kind were possible at the stage of microscope technique which Leidy commanded; were our knowledge of this property of the white blood corpuscle lost to us it would be exceedingly difficult to re-establish it without the use of the warm stage.

Such is a brief epitome of the labors of Joseph Leidy in the anatomy of vertebrates. It is a theme for a volume. But the man is greater than his works. All who knew Dr. Leidy are witnesses to the impression of strength in reserve he at all times made. It can be said of him as has been said of Haller by Francis Horner: "I never rise from an account of such a man without a sort of thrilling palpitation about me which I know not whether I should call admiration, ambition, or despair."

LETTERS TO THE EDITOR.

**** Correspondents are requested to be as brief as possible. The writer's name is in all cases required as proof of good faith.*

On request in advance, one hundred copies of the number containing his communication will be furnished free to any correspondent.

The editor will be glad to publish any queries consonant with the character of the journal.

Work and Energy.

IN many of the standard text-books and treatises on mechanics there is a lack of definiteness in the elementary treatment of the subjects of work and energy that often proves troublesome to the student. To illustrate this, let us place side by side the definitions of work and energy given in the "Syllabus of Elementary Dynamics" prepared by the Association for the Improvement of Geometrical Teaching.

(a) When the particle (or point of a body) to which a force is applied moves in the line in which the force acts, the force is said to do work, or to have work done against it, according as the motion is in the sense of the force or in the opposite sense.

(b) Energy is a general term for the capability of doing work, which from any cause a mass, or different masses in their relation to one another, may possess.

These definitions are in substantial agreement with those most often given, and are the only explicit statements usually found as to the meaning of work and energy.

A careful reading shows, however, that there is in definition (b) an implicit suggestion of something not definitely stated, and concerning which a definite statement is very much needed. According to the definition, energy is possessed by masses (i.e., by bodies); or, in other words, a body may do work. But what is meant by

a body doing work? In most text-books the student will search in vain for a definite answer to this question.

Another question is suggested by the definition of work above quoted. It is clearly stated when work is done by a force and when work is done against a force. But in the latter case, what is it that does the work?

These two questions are sure to present themselves to the thoughtful student. If the definition of work were so stated as to furnish explicit answers to them, the acquirement of correct notions would be much facilitated.

A source of confusion slightly different from that above mentioned is found in certain books. Work is defined as if always done by forces; while energy is defined simply as capacity for doing work. The inference might naturally be drawn that energy is possessed by forces. But the student who draws this logical conclusion will be perplexed by finding that, in what follows, energy is always referred to as belonging to bodies instead of forces.

As an improved statement of the fundamental definitions of work and energy, the following may be suggested:

1. A force does work upon the body to which it is applied when the point of application moves (or has a component of motion) in the direction toward which the force acts.

2. A body does work against a force applied to it when the point of application moves (or has a component of motion) in the direction opposite to that toward which the force acts.

3. A body possesses energy when its condition is such that it can do work against applied forces.

Definitions (1) and (3) are not substantially different from definitions commonly given. Definition (2) is usually not given explicitly, though always implied in the development of the theory of energy.

It is quite possible that these definitions may admit of improvement. They must, of course, be accompanied by quantitative statements as to how work and energy are to be computed. But it is believed that the clear development of the subject is much facilitated if explicit definitions similar to these are given at the outset.

No attempt is here made to criticise all the various methods of treating the subject of work. Other forms of definition than the one above considered are found in various books. In most cases, however, they lead to the same difficulty above mentioned.

A treatment practically identical with that here suggested is adopted in McGregor's "Kinematics and Dynamics"—a book possessing many other admirable features—and possibly in other works. It certainly is not adopted by some of the best known English writers.

L. M. HOSKINS.

Madison, Wis., Nov. 9.

AMONG THE PUBLISHERS.

EVER since the announcement made last winter that the author of "Robert Elsmere" had a new novel under way, expectation has been eager to know when it would appear. Mrs. Ward, like George Eliot, has once more taught us that fiction, far from being merely a superficial representation of passing situations and emotions, may grapple with the greatest problems and teach men noble truths. It is with pleasure, therefore, that we publish the fact that Mrs. Ward's new book is to appear very soon from the press of Messrs. Macmillan & Co., New York, and that it is to be called "The History of David Grieve." It is understood that the book will trace the career of a disciple of the Elsmirian doctrines in his work among the poor of London.

—There lives an Indian people on the Carribbean coasts of Nicaragua and parts of Honduras, which is largely mixed with African and Indian elements, foreign to them, on the littoral tracts, but farther inside is of purer race. This people is known to the whites as Moskitos, or as they want to be called, *Misskitos*; their language was but imperfectly studied, probably because the tribes inspired their visitors with contempt on account of their subserviency to English interests. Only the missionaries of the Herrnhut denomination spent time enough for mastering entirely the intricacies of this tropical language, and from their writings,

as well as from those of Rev. M. Henderson, of Rev. W. Grunewald, and of three Prussian delegates sent to Nicaragua before 1845. Mr. Lucien Adam has made a thorough investigation of this tongue. His "Langue Mosquito" has just been published by J. Maisonneuve, 25 Quai Voltaire, Paris, and forms the fourteenth volume of his "Bibliothèque linguistique Américaine" (184 pp., 8°). The texts include a number of stories from the New and Old Testament and some hymns, the ten commandments and two love songs, all with a French translation. The vocabulary fills thirty pages and the grammatical sketch contains the full paradigms of several verbs, which inflect by person-suffixes and possess a negative form. The phonetic side of the idiom may be characterized as rather vocalic than consonantic and the vowels *a*, *i*, *u*, largely exceed in frequency the other vowels.

— A novelty in calendars is the "Slide-Rule Perpetual Calendar," recently issued by the Jerome-Thomas Company of this city. As its name indicates, it is an application of the well-known slide-rule principle to a perpetual calendar, by means of a table of year-letters extending from the first year of the Christian era to the year 2800 (with means of infinite extension).

— The pictures of outdoor life in Canada presented in "Lady Dufferin's Journal" will interest many readers. Lady Dufferin gives a description of the various social and civic functions in which she took part with the Governor-General, and she also describes her salmon-fishing and camping trips. "Lady Dufferin's Journal" is published by D. Appleton & Co.

— Houghton, Mifflin, & Co. announce "Colonial Furniture of New England," a study of the domestic furniture in use in the seventeenth and eighteenth centuries, by Irving Whitall Lyon, M.D., member of the Connecticut Historical Society, illustrated with about one hundred large heliotypes; also the twelfth volume of the *Gentleman's Magazine Library*, comprising the articles on "English Topography," edited by G. L. Gomme.

— Another volume of Mr. Lowell's essays is said to be in the hands of his executor, Professor Norton, and will shortly be published. It will include Lowell's papers on Milton, Gray, and Landor; his sketch of Keats prefacing poems of Keats in the "British Poets"; his paper on Izaak Walton, printed as an introduction to the recent edition of "The Complete Angler," and an address before the Modern Language Association.

— Messrs. Longmans, Green & Co. will publish next month Mr. W. J. Henderson's new book, "Preludes and Studies; Musical Themes of the Day." The volume will contain a discussion of that fruitful theme, Wagner's "Ring des Nibelungen," together with other interesting Wagnerian essays. Perhaps the most valuable feature of the book for students and lovers of music in general will be the essay on "The Evolution of Piano Music," which includes a mass of facts not before accessible from any one source, and most of which are not to be found in any other work in English. The study of Schumann's symphonic writing will appeal to all readers who look below the surface of music.

— An account of "The Rise of the Pottery Industry," by Edwin A. Barber, is to appear in the December *Popular Science Monthly*. It will be illustrated with figures of early American ware, the apparatus used in making it, etc. This is the tenth article in the *Monthly's* illustrated series on American industries. Volcanoes in Connecticut are what very few persons would expect to find, but Prof. W. M. Davis has found a place near Meriden where they have been, and will describe his discoveries in an illustrated article. The fourth and last of Prof. Frederick Starr's papers on "Dress and Adornment" will also appear. It deals with "Religious Dress," including the dress of religious officers, of worshippers, of victims, of mourners, amulets and charms, and the religious meaning of mutilations. It will be illustrated. An invention that bids fair to work a revolution in printing, namely, type-casting machines, will be described by P. D. Ross. A cut of each of the two forms will be given. These machines are used by several of the largest newspapers in the United States, and have been ordered for a number of others. The principles in-

involved in "The Training of Dogs" will be given by Dr. Wesley Mills. The article will contain pictures of a number of champion hunting-dogs.

— The History Company, San Francisco, Cal., have just issued another volume of H. H. Bancroft's series of "Chronicles of the Builders of the Commonwealth." Instead of following the publication of Vol. I. of this work with Vols. II., III., and IV., the publishers skip for the time being to Vol. V., the intervening volumes being nearly ready and to follow at short intervals. In the framework of Vol. V., the subject of which is "Routes and Transportation," there is much original matter. The material is drawn from innumerable original sources never before put into print. It covers the entire groundwork of inland and oceanic navigation, stage lines, telegraphic lines, and railway lines, the evolution of the express business, and everything connected with the subject in the fullest detail and in the most interesting style.

— One of the largest book deals ever consummated in America, it is reported, was closed Oct. 27 by cablegram, the University of Chicago being the purchaser and S. Simon of Berlin, the seller. The library contains 280,000 volumes and 120,000 dissertations in all languages. Among them there are 200 manuscripts from the eighth to the nineteenth century, 1,600 volumes of paleography, 15,000 journals, academies, and periodicals, 65,000 volumes of Greek and Roman archæology, 65,000 Greek and Roman classics, 2,400 volumes Greek and Latin authors of modern times, 2,000 Greek and Roman philology and grammar, 2,000 volumes general linguistics, 3,000 volumes modern linguistics, 2,500 volumes history, 1,000 illustrated works of art, 5,000 volumes physics, astronomy, and mathematics, and 5,000 volumes natural history.

— We have received from C. W. Bardeen of Syracuse a little pamphlet entitled "Thoughts from Earnest Women," arranged by the Women's Literary Club of Dunkirk. It consists of brief extracts, mostly in prose, from a large number of women writers of various times and countries, and is a collection of considerable merit. Most of the extracts relate to the conduct of life, some being moral, others prudential, and they indicate for the most part good sense both in the authors and in the compilers. The compilers are in favor of widening woman's sphere of work and of influence, and do not believe that she ought to confine herself exclusively to her family; and several of the authors quoted are advocates of woman suffrage. The interest of the collection, however, is by no means confined to women readers, but most of the extracts are as interesting and instructive to men as to women. The pamphlet is well worth the fifteen cents that it costs. Mr. Bardeen also sends us a work on "Elementary English," by John D. Wilson, prepared with reference to the Regents' examinations in the State of New York; but we cannot say that the work is well fitted for its purpose. The Regents issued in April last a bulletin in which they sketched a course of study in the elements of English, and this book has evidently been hastily gotten up to meet the Regents' requirements. The definitions are altogether too brief and too abstract, with very few illustrative examples; and the rules of punctuation are insufficient, and not illustrated by any examples at all. Moreover, there are some grammatical blunders in the book, as, for instance, in the first paragraph, where we read that "the word or words which makes the assertion is the predicate." When two subjects are connected by *or*, the verb ought to agree with the one that stands the nearest, and therefore the above sentence ought to have read thus: the word or words which *make* the assertion *are* the predicate. The book may be of some use to teachers as a synopsis of its subject, but it is of no value to students.

— Whittaker & Co., London, has just issued "Light" in the "Whittaker Library of Popular Science." This book is by Sir Henry Trueman Wood, Secretary of the London Society of Arts, who makes no pretence of being a specialist in the department of physics of which he writes, but he claims a thorough familiarity with the difficulties which beset the path of those humble students of science who can devote their leisure only, not their working life, to their favorite pursuit. This perhaps indicates, as well as

anything could, the mode of treatment of the subject; and, as to the scope of the book, it may be said that all the usual phenomena of light are described, and something of the theory given, though we do not find any reference to the recent investigations of Hertz and others showing experimentally the relation between light phenomena and those of electricity. Macmillan & Co. are the New York publishers.

—The Rev. Alfred J. Church, the well-known author of "Stories from Homer," etc., has written a novel of the time of Nero, which Macmillan & Co. will publish under the title of "The Burning of Rome." The book, which contains a number of illustrations, is just ready.

—"Principles and Practice of Plumbing," by S. Stevens Hellyer has just been issued by D. Van Nostrand Co., New York. It would seem that it might be difficult to find a person with sufficient knowledge of plumbing and having the habit of writing sufficiently developed who could produce a book on the subject. These two qualities are united in Mr. Hellyer, who is known for his earlier books, "The Plumber and Sanitary Houses," and "Lectures on the Science and Art of Sanitary Plumbing." The present volume is one of the series of "Technological Handbooks" edited by Sir H. Trueman Wood, Secretary of the London Society of Arts, to which Prof. William Crookes, for instance, contributed the initial number, on "Dyeing and Tissue-printing." The

opening chapters are devoted to lead and its many uses in building operations, but the rest of the book contains much on what is known as sanitary engineering, at least in so far as this may be limited to the house.

—Houghton, Mifflin & Co. have published a small volume entitled "Land of the Lingering Snow," by Frank Bolles, being an account of outdoor walks in New England in spring time. It is, therefore, somewhat in the style of Thoreau's works, though Mr. Bolles is hardly equal to his prototype. His work is almost entirely descriptive, with hardly any of those moral reflections such as often light up the pages of Thoreau. Moreover, it is too full of petty detail, as the following specimen passage will show: "Leaving the railway, I wound my way back towards Stony Brook, passing through groves of small oaks, meadows full of treacherous pools covered with brittle ice, belts of whispering white-pines, apple orchards and wood-roads leading up hill and down, ending nowhere. Four miles of this wandering brought me to Kendal Green station in Weston, with a record of twenty crows, eighteen chickadees, sixteen tree-sparrows and three blue jays" (p. 40-41). For lovers of nature, however, the book will have an interest, and it is written in a simple and refined style.

—The November number of the *Annals of the American Academy of Political and Social Science* is interesting on account of the number of articles it contains which discuss new ideas

NEO-DARWINISM AND NEO-LAMARCKISM.

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Annual address of the President of the Biological Society of Washington delivered Jan. 24, 1891. A historical and critical review of modern scientific thought relative to heredity, and especially to the problem of the transmission of acquired characters. The following are the several heads involved in the discussion: Status of the Problem, Lamarckism, Darwinism, Acquired Characters, Theories of Heredity, Views of Mr. Galton, Teachings of Professor Weismann, A Critique of Weismann, Neo-Darwinism, Neo-Lamarckism, the American "School," Application to the Human Race. In so far as views are expressed they are in the main in line with the general current of American thought, and opposed to the extreme doctrine of the non-transmissibility of acquired characters.

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about American politics. Gamaliel Bradford is the author of the first article, which is entitled "Congress and the Cabinet," and which advocates permitting cabinet officers to appear in Congress to give advice and answer questions. "The Place of Party in the Political System," by Anson D. Morse of Amherst College, is a defense of the party system. E. P. Oberholtzer in his "Law making by Popular Vote," shows that there has been used at various times in American history a form of the Swiss Referendum. The other two main articles are "Recent Tendencies in the Reform of Land Tenure," by E. P. Cheyney, of the University of Pennsylvania, and "Some Neglected Points in the Theory of Socialism," by T. B. Veblen. The department of the *Annals* devoted to personal notes contains brief biographies of the following men, who have been appointed to positions in the schools of political science or political economy in the various colleges: J. R. Commons of Oberlin, W. M. Daniels of Wesleyan, Marietta

Kies of Mills College, E. A. Ross of the University of Indiana, F. H. Hodder of Kansas State University, H. B. Gardner of Brown, S. B. Weeks of Trinity, N. C., C. G. Tiedeman of the College of the City of New York, C. F. A. Currier of the Massachusetts Institute of Technology, W. F. Willcox of Cornell, F. W. Moore, S. Sherwood, A. B. Woodford and L. K. Stein of the University of Pennsylvania, Max von Heckel of Wurzburg, Cort van den Linden of Amsterdam, and Achille Loria of Padua. There has been a change in the editorial force of the *Annals*. Professor F. H. Giddings, formerly one of the associate editors, has resigned on account of his many outside duties, and Dr. J. H. Robinson of the University of Pennsylvania has been appointed in his place. Dr. Robinson is lecturer on European history in the Wharton School of Finance and Economy, and is the author of a monograph on the "Original Features of the United States Constitution," and a work on the "German Bundesrath."

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